

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.





95B261  
A17F6

*Sh*

ates  
Department of  
Agriculture  
Forest  
Service  
Intermountain  
Region  
Ogden, Utah



# Forest Insect and Disease Conditions in the Intermountain Region 1990





**PHOTOGRAPHER:** K. Andrew Knapp  
Forest Pest Management  
Boise Field Office

**COVER STORY:** A portion of a 2,900-acre area of Douglas-fir tussock moth defoliation on the Ogden Ranger District, Wasatch-Cache National Forest, is pictured. Defoliation of Douglas-fir, subalpine fir, and white fir caused by the Douglas-fir tussock moth was detected in several widely scattered areas within the Intermountain Region. Defoliation will likely result in tree mortality, top-kill, and growth reduction.

**FOREST INSECT AND DISEASE CONDITIONS**  
**in the**  
**Intermountain Region**  
**1990**

**Compiled by:**  
**A. Knapp**  
**J. Weatherby**  
**J. Hoffman**  
**D. Hansen**  
**L. LaMadeleine**  
**R. Williams**

**Forest Pest Management**  
**State and Private Forestry**  
**USDA Forest Service**  
**Intermountain Region**  
**324 - 25th Street**  
**Ogden, Utah 84401**

**January 1991**





## FOREST PEST MANAGEMENT INTERMOUNTAIN REGION

---

**Regional Office**  
**324 - 25th Street**  
**Ogden, Utah 84401**  
**(801) 625-5257**  
**FTS 586-5257**

David G. Holland. . . . .	Group Leader
Garth E. Baxter. . . . .	Pesticide Coordinator

**Ogden Field Office**  
**324 - 25th Street**  
**Ogden, Utah 84401**  
**(801) 625-5458**  
**FTS 586-5458**

Leon A. LaMadeleine . . . . .	Plant Pathologist/Ogden Field Office Representative
John A. Anhold . . . . .	Entomologist
Dawn E. Hansen. . . . .	Entomologist
A. Steven Munson. . . . .	Entomologist
Valerie L. Kalve. . . . .	Biological Technician
Nancy P. Wright . . . . .	Computer Assistant

**Boise Field Office**  
**1750 Front Street, Room 202**  
**Boise, Idaho 83702**  
**(208) 364-4220**  
**FTS 554-4220**

Ralph E. Williams . . . . .	Plant Pathologist/Boise Field Office Representative
R. W. Thier . . . . .	Entomologist
Julie C. Weatherby. . . . .	Entomologist
James T. Hoffman. . . . .	Plant Pathologist
Joy C. Roberts. . . . .	Computer Programmer Analyst
K. Andrew Knapp . . . . .	Biological Technician
Philip J. Mocettini, Jr. . . . .	Biological Technician
Richard L. Halsey . . . . .	Biological Technician
Marianne Morabito . . . . .	Secretary





## TABLE OF CONTENTS

Subject	Page
Introduction. . . . .	1
Résumé of Conditions . . . . .	2
Status of insect conditions . . . . .	4
Status of disease conditions . . . . .	8
Special Project Update. . . . .	30
Recent publications. . . . .	33

## TABLE OF CONTENTS (CONT.)

Page

### TABLES

Table	1. Number of trees killed by bark beetles in Region 4 during 1990 as determined by aerial detection surveys . . . . .	12
	2. Status of mountain pine beetle infestations by state during 1990. .	13
	3. Status of spruce beetle infestations in Idaho during 1990. . . . .	14
	4. Status of Douglas-fir beetle infestations by state during 1990. . . .	15
	5. Status of western pine beetle infestations by state during 1990 . . .	16
	6. Status of Jeffrey pine beetle infestations by state during 1990 . . .	16
	7. Status of fir engraver beetle and western balsam bark beetle infestations by state during 1990. . . . .	17
	8. Acres of defoliation by Douglas-fir tussock moth in Region 4 during 1990 as determined by aerial detection surveys . . . . .	19
	9. Status of Douglas-fir tussock moth by state during 1990 . . . . .	20
	10. Acres of defoliation by western spruce budworm in Region 4 during 1989-1990 as determined by aerial detection surveys . . . .	21
	11. Status of western spruce budworm by state during 1990. . . . .	21
	12. Dwarf mistletoe accomplishments - Intermountain Region, 1990. .	22

### ILLUSTRATIONS

Figure	1. Areas infested by mountain pine beetle and Jeffrey pine beetle in Region 4 during 1990 as observed during aerial detection surveys. . . . .	23
	2. Areas infested by spruce beetle in Region 4 during 1990 as observed during aerial detection surveys. . . . .	24
	3. Areas infested by Douglas-fir beetle in Region 4 during 1990 as observed during aerial detection surveys. . . . .	25
	4. Areas infested by western pine beetle and pine engraver beetle in Region 4 during 1990 as observed during aerial detection surveys. . . . .	26
	5. Areas infested by fir engraver beetle and western balsam bark beetle in Region 4 during 1990 as observed during aerial detection surveys. . . . .	27
	6. Areas infested by Douglas-fir tussock moth in Region 4 during 1990 as observed during aerial detection surveys. . . . .	28
	7. Areas infested by western spruce budworm in Region 4 during 1990 as observed during aerial detection surveys. . . . .	29



## INTRODUCTION

---

This report briefly summarizes the status of insect and disease pests of forest trees in the Intermountain Region. Status of diseases is based largely on ground observations and surveys. Status of insects is based primarily on annual and special aerial surveys conducted over approximately 14 million forested acres in 1990 and, to a lesser extent, ground-based detection and evaluation surveys.

General insect and disease damage information is summarized in the *Résumé of Conditions*.

Numbers of trees killed by major bark beetles and acreage of defoliating insect activity are displayed in Tables 1 through 9. Estimates are based on aerial survey information. General locations of major pest activity are shown in Figures 1 through 7.

Since information is collected in a similar manner each year, the information from maps and tables from various year's reports can be compared to determine trends.

In an effort to minimize redundancy in this report, narratives have been reduced and pertinent information is included in the Status of Insects and Status of Diseases sections.

Brief summaries of technology development projects conducted or anticipated are presented to keep readers abreast of how Forest Pest Management is using pest outbreaks to improve pest management technology.

Recent publications are listed to aid the reader in locating specific recent pest information of interest.

## RÉSUMÉ OF CONDITIONS

---

Tree mortality, caused by mountain pine beetle, decreased throughout the Region with 11,900 trees (primarily lodgepole pine) killed in 1990 compared to 40,000 trees in 1989. This was the lowest mortality recorded since aerial detection surveys were begun in the early 1960's. Decreasing levels of mortality occurred throughout all infested areas. The largest infestation continued to be located in the Sawtooth National Recreation Area in Idaho where 5,000 trees were killed. Smaller, less significant infestations were located on the Salmon, Challis, and Boise National Forests in southern Idaho; the Manti-LaSal and Dixie National Forests in southern Utah; and the Bridger-Teton National Forest in western Wyoming.

Three major spruce beetle infestations killed 194,400 trees in 1990 compared to 46,900 trees killed in 1989. This increase can be attributed to a high mortality rate of smaller diameter trees on the Payette National Forest in southern Idaho. In Utah, spruce beetle infestations located on portions of the Manti-LaSal and Fishlake National Forests killed 8,700 trees in 1990, a moderate reduction from mortality levels in 1989. Elsewhere, only small, isolated infestations were detected.

Static levels of Douglas-fir beetle activity were noted throughout most Forests in the Region with 178,400 trees killed in 1990 compared to 190,200 in 1989. All Forests in southern Idaho have significant areas of host type infested. The Boise National Forest has the largest infestation in the Region with 62,400 trees killed, a small decrease from 1989 mortality levels. Smaller infestations occurred on all other Forests in southern Idaho. In Utah, increasing levels of Douglas-fir beetle activity were recorded on the Ashley and Manti-LaSal National Forests, while decreasing mortality was recorded on the Wasatch-Cache National Forest. Tree mortality levels on the Bridger-Teton National Forest in western Wyoming increased moderately with 12,100 trees killed in 1990 compared to 9,300 trees in 1989.

Western pine beetle activity, often in conjunction with *lps* beetle activity, decreased by 50 percent from 1989 levels with 23,800 trees killed in 1990 compared to 53,200 trees killed in 1989. Activity was located on the Boise and Payette National Forests in southern Idaho and affects primarily second-growth ponderosa pine.

Fir engraver beetle and western balsam bark beetle killed 214,100 trees in 1990 compared to 186,800 trees in 1989. The primary host for fir engraver beetle was grand fir in southern Idaho, white fir in Utah, and white fir and red fir in Nevada. Western balsam bark beetle infested subalpine fir throughout the host range in southern Idaho, Utah, and Nevada. Because of the overlapping and intermixed host range and subsequently infested areas, tree mortality caused by western balsam bark beetle and fir engraver beetle were grouped together during aerial detection surveys. Increases in mortality occurred on the Boise, Caribou, Payette, and Targhee National Forests in southern Idaho; the Wasatch-Cache National Forest in Utah; and the Bridger-Teton National Forest in western Wyoming where a ten-fold increase in mortality was detected. In 1990, mortality levels decreased within the largest infestation in the Region located on the Toiyabe National Forest in western Nevada. Mortality levels dropped from 132,00 trees in 1989 to 85,000 trees in 1990.

The Jeffrey pine beetle continued to kill trees on the Toiyabe National Forest in western Nevada with 85,500 trees killed, a significant increase from 1989. In 1990, most host type on the Forest was infested.

Defoliation by western spruce budworm increased significantly with 42,600 acres of defoliation observed in 1990 compared to 10,900 acres in 1989. All defoliation occurred in southern Idaho. Defoliation in 1990 increased on the Salmon and Challis National Forests and decreased on the Targhee National Forest.



For the first time since the early 1970's, significant defoliation of conifers by Douglas-fir tussock moth was detected. In southern Idaho, 50,700 acres of Douglas-fir and subalpine fir on the Boise, Sawtooth, and Payette National Forests were defoliated. Defoliation was classified as mostly moderate to heavy. Approximately 900 acres of Douglas-fir were lightly defoliated in the Owyhee Mountains south of Boise. In northern Utah, 2,900 acres of mostly subalpine fir were moderately to heavily defoliated on the Wasatch-Cache National Forest.

A major gypsy moth infestation continues in the Davis, Utah, and Salt Lake counties in Utah. Eradication efforts continued for the second year with application of the biological insecticide, *Bacillus thuringiensis* (B.t.). In treated areas, male moth catches were reduced by approximately 95 percent. In areas outside the treatment blocks, gypsy moths were detected in pheromone-baited traps in Summit and Wasatch counties in Utah. About 30,000 acres will be treated in 1991.

Multiagency gypsy moth monitoring occurred in all states encompassed by the Intermountain Region. Gypsy moths were detected in pheromone-baited traps in Idaho Falls, Idaho.

Activity of most major root/stem and branch pathogens of forest and urban trees is not closely monitored because infections remain for more than a single year, and their status does not often change rapidly; or when it does change rapidly, the amount of change is difficult to assess over widespread areas. Status of many foliar pathogens, while capable of changing rapidly, are not often surveyed due to the often sporadic occurrence of these pests across the landscape and the lack of knowledge concerning their effects.

Often then, activity of disease agents, if presented at all, is reported only in very general terms. Only information concerning obvious major change is usually noted.

Thus, the dearth of disease information presented in the annual insect and disease conditions reports should not be construed to indicate that diseases are unimportant in the Intermountain Region. Diseases are of significance. Dwarf mistletoes infect 40 percent of the forests in the region, resulting in an estimated impact of 36 million cubic feet of volume loss annually. It is likely that most forest trees are infected to some extent by root pathogens, causing unestimated mortality and growth loss and predisposing trees to attack by bark beetles and other insect pests. Stem decays occur frequently in overmature trees reducing volume by over 50 percent. Foliar diseases likely have as much impact on forest growth over a given period as does a major defoliator outbreak over a similar time period.

## Status of insects in southern Idaho, Nevada, Utah, and western Wyoming

Insect	Host	Location	Remarks
<b>Alder flea beetle</b> <i>Altica ambiens</i>	Alder	Idaho	No significant activity was reported in 1990.
<b>Boxelder leafroller</b> <i>Caloptilia negundella</i>	Boxelder	Idaho	Boxelder trees along the Salmon River in the vicinity of Salmon, Idaho, were heavily infested with this leafroller.
<b>Cooley spruce gall adelgid</b> <i>Adelges cooleyi</i>	Spruce	Idaho, Utah, Wyoming	No significant activity was reported in 1990.
<b>Douglas-fir pole beetle</b> <i>Pseudohylesinus nebulosus</i>	Douglas-fir	Idaho	No significant activity was reported in 1990.
<b>Douglas-fir beetle</b> <i>Dendroctonus pseudotsugae</i>	Douglas-fir	Idaho, Utah, Wyoming	Mortality remained static with 178,400 trees killed by Douglas-fir beetle. In Idaho, mortality decreased on the Boise, Sawtooth, and Targhee National Forests; remained static on the Payette National Forest; and increased on the Caribou, Challis, and Salmon National Forests. Mortality decreased on the Wasatch-Cache National Forest in Utah and increased on the Bridger-Teton National Forest in Wyoming.
<b>Douglas-fir tussock moth</b> <i>Orgyia pseudotsugata</i>	Douglas-fir	Idaho, Utah	Trees on approximately 54,000 acres on the Boise, Payette, and Sawtooth National Forests in Idaho and the Wasatch-Cache National Forest in Utah were defoliated. Defoliation levels were mostly moderate to heavy.
<b>Fir engraver beetle</b> <i>Scolytus ventralis</i>	Grand fir, White fir	Idaho, Nevada, Utah	Activity increased Regionwide. Large infestations occurred on the Boise and Payette National Forests in Idaho, the Toiyabe National Forest in Nevada, and the Uinta and Wasatch-Cache National Forests in Utah.



# Status of insects in southern Idaho, Nevada, Utah, and western Wyoming--Continued

Insect	Host	Location	Remarks
<b>Gypsy moth</b> <i>Lymantria dispar</i>	Hardwoods	Idaho, Nevada, Utah	Three, 20,000-acre aerial applications of <i>B.t.</i> were applied to an infestation near Salt Lake City, Utah, in a continuing eradication program. Following treatment, only 249 moths were captured in pheromone-baited traps compared to 2,239 positive catches in 1989. Approximately 250 moths were caught outside the treatment blocks. A total of three moths were captured in Idaho Falls, Idaho. A single moth was caught outside Las Vegas, Nevada.
<b>Ips pilifrons</b>	Spruce	Utah	Moderate infestations of this insect were found on the Pine Valley Ranger District, and heavy infestations were found in Peterson Grove on the Teasdale Ranger District, Dixie National Forest.
<b>Jeffrey pine beetle</b> <i>Dendroctonus jeffreyi</i>	Jeffrey pine	Nevada	Jeffrey pine mortality increased with 85,500 trees killed on the Toiyabe National Forest in Nevada. Virtually all susceptible host type on the Forest was infested.
<b>Large aspen tortrix</b> <i>Choristoneura conflictana</i>	Aspen	Utah	No significant activity was reported in 1990.
<b>Locust borer</b> <i>Megacyllene robiniae</i>	Black locust	Idaho	No significant activity was reported in 1990.
<b>Mountain mahogany looper</b> <i>Anacamptodes clivinaria profanta</i>	Mountain mahogany	Nevada	Mountain mahogany were defoliated by this looper in the McDonald Creek drainage of the Mountain City Ranger District, Humboldt National Forest.
<b>Mountain pine beetle</b> <i>Dendroctonus ponderosae</i>	Lodgepole pine, Ponderosa pine, Other pines	Idaho, Utah, Wyoming	Mountain pine beetle activity decreased Regionwide to the lowest levels recorded. During 1990, 11,900 trees were killed. The largest infestation was located on the Sawtooth National Recreation Area in Idaho. Smaller infestations occurred on the Manti-LaSal and Dixie National Forests in Utah and on the Challis, Salmon, and Boise National Forests in Idaho.
<b>Oyster shell scale</b> <i>Lepidosaphis ulmi</i>	Cottonwoods	Utah	Cottonwood and poplar trees were heavily infested with oystershell scale in Ranch Canyon located in the Bureau of Land Management Beaver Resource Area.

# Status of insects in southern Idaho, Nevada, Utah, and western Wyoming--Continued

Insect	Host	Location	Remarks
<b>Pine butterfly</b> <i>Neophasia menapia</i>	Ponderosa pine	Idaho	No significant activity was reported in 1990.
<b>Pine engraver beetle</b> <i>Ips pini</i>	Pines	Idaho, Nevada	Mortality occurred throughout southern Idaho and western Nevada. It was often associated with western pine beetle and Jeffrey pine beetle activity.
<b>Pine needle sheathminer</b> <i>Zelleria haimbachi</i>	Lodgepole pine	Idaho	No significant activity was reported in 1990.
<b>Ponderosa pine needleminer</b> <i>Coleotechnites moreonela</i>	Ponderosa pine	Idaho	Mining of older needles on ponderosa pines on approximately 800 acres near Featherville, Idaho, was detected during aerial surveys.
<b>Silver fir beetle</b> <i>Pseudohylesinus sericeus</i>	Grand fir	Idaho	Unusually large populations of silver fir beetle in conjunction with fir root bark beetle were detected overwintering in grand firs from Smith's Ferry to McCall, Idaho.
<b>Spotted aspen leafroller</b> <i>Siaphila duplex</i>	Aspen	Wyoming	Defoliation by this insect was observed on aspen in the town of Big Piney, Wyoming.
<b>Spruce beetle</b> <i>Dendroctonus rufipennis</i>	Engelmann spruce	Idaho, Utah, Wyoming	Approximately 194,000 trees were killed in three large infestations. Tree mortality within the largest infestation on the Payette National Forest in Idaho, increased considerably from 1989 levels. Mortality levels in two infestations on the Manti-LaSal National Forest decreased moderately.
<b>Spruce bud scale</b> <i>Physokermes piceae</i>	Spruces	Idaho	No significant activity was reported in 1990.
<b>Sugar pine tortrix</b> <i>Choristoneura lambertiana</i>	Pines	Idaho	No significant activity was reported in 1990.
<b>Western balsam bark beetle</b> <i>Dryocoetes confusus</i>	Subalpine fir	Idaho, Utah, Wyoming	Increases in mortality occurred on the Targhee and Caribou National Forests in Idaho. In Utah, large increases in mortality were observed on the Wasatch-Cache National Forest while smaller infestations occurred on the Dixie and Uinta National Forests.



# Status of insects in southern Idaho, Nevada, Utah, and western Wyoming--Continued

Insect	Host	Location	Remarks
<b>Western pine beetle</b> <i>Dendroctonus brevicomis</i>	Ponderosa pine	Idaho	A 50-percent reduction in tree mortality occurred on the Boise and Payette National Forests in Idaho. Mortality occurred most frequently in second-growth ponderosa pine.
<b>Western plineshoot borer</b> <i>Eucosma sonomana</i>	Ponderosa pine	Idaho	No significant activity was reported in 1990.
<b>Western spruce budworm</b> <i>Choristoneura occidentalis</i>	Douglas-fir, Spruce, True firs	Idaho	Defoliation increased from the low levels of recent years. Trees on approximately 42,900 acres were defoliated on the Salmon and Challis National Forests in Idaho. Most defoliation was classified as light to moderate.
<b>Western tent caterpillar</b> <i>Malacosoma californicum</i>	Cottonwoods	Utah	Heavy defoliation on cottonwoods at Otter Creek State Park resulted in topkill and branch mortality of many trees within the park.
<b>Willow leaf beetle</b> <i>Altica bimarginatana</i>	Willow	Nevada	Stands of willow were defoliated by this leaf beetle north of Merritt Mountain on the Mountain City Ranger District.

## Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming

Disease	Host	Location	Remarks
<b>Stem and Branch Diseases</b>			
<b>Aspen trunk rot</b> <i>Phellinus tremulae</i>	Aspen	Idaho, Nevada, Utah, Wyoming	Decay occurred in most aspen stands in the Region.
<b>Comandra blister rust</b> <i>Cronartium comandrae</i>	Lodgepole pine, Ponderosa pine	Idaho, Utah, Wyoming	Infection occurred infrequently throughout Idaho and Utah. Heavy, localized areas of infection resulting in branch, top, and entire tree mortality of sapling-size ponderosa pines occurred in southeastern Idaho. In Wyoming, infection frequently occurred in lodgepole pine stands.
<b>Cytospora canker of true firs</b> <i>Cytospora sp.</i>	True firs	Idaho, Nevada, Utah	Infection resulted in light to heavy levels of branch flagging, topkilling, and mortality, often in localized areas throughout the host types. Symptoms were less frequently observed than in 1989. However, in several areas in southern Idaho, significant mortality resulting from infection by this fungus occurred.
<b>Dwarf mistletoes</b> <i>Arceuthobium spp.</i>	Douglas-fir, Lodgepole pine, Ponderosa pine, Western larch, Jeffrey pine	Idaho, Nevada, Utah, Wyoming	These pathogens continued to be the most widespread and frequently observed pests in the Intermountain Region. Suppression projects removed infected overstory trees from 5,233 acres.
<b>Limb rust</b> <i>Peridermium filamentosum</i>	Ponderosa pine	Utah	Infection occurred in stands on the Dixie National Forest.
<b>Red ring rot</b> <i>Phellinus pini</i>	Western larch, True firs, Spruce, Douglas-fir, Pines	Idaho, Utah, Wyoming	This fungus occurred throughout the Region in stands of mature conifers. Infection intensity was variable.
<b>Rust-red stringy rot</b> <i>Echinodontium tinctorium</i>	Grand fir, White fir, Subalpine fir	Idaho, Nevada	Decay caused by this fungus was common in mature and overmature stands of true firs.

## Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming--Continued

Disease	Host	Location	Remarks
<b>Stalactiform blister rust</b> <i>Cronartium coleosporioides</i>	Lodgepole pine	Idaho, Utah, Wyoming	This rust occurred in localized areas throughout the host type. Heavy infection has been noted in localized areas on the Salmon, Sawtooth, and Targhee National Forests in Idaho.
<b>Western gall rust</b> <i>Endocronartium harknessii</i>	Lodgepole pine, Ponderosa pine	Idaho, Utah, Wyoming	Gall rust occurred throughout host types. Infection levels were variable and, in localized areas, extremely heavy on lodgepole pine.
<b>White pine blister rust</b> <i>Cronartium ribicula</i>	Limber pine, Whitebark pine	Idaho, Wyoming	This disease was commonly found on both 5-needle pine hosts on the Payette, Salmon, and Sawtooth National Forests.

### Root Diseases

<b>Annosus root disease</b> <i>Heterobasidion annosum</i>	Douglas-fir, Engelmann spruce, Lodgepole pine, Ponderosa pine, True firs	Idaho, Nevada, Utah, Wyoming	Infection resulted in varying amounts of a root and butt rot of many tree species. Infection-induced mortality occurred frequently in young ponderosa pine and infrequently in Douglas-fir and subalpine fir.
<b>Armillaria root disease</b> <i>Armillaria</i> sp.	Douglas-fir, Grand fir, Pines, Spruce, Subalpine fir	Idaho, Nevada, Utah, Wyoming	Evidence of <i>Armillaria</i> could be found throughout the Region. In southern Idaho, northern Utah, Nevada, and Wyoming, it functioned primarily as a weak pathogen or saprophyte causing little mortality. In southern Utah, it acted in conjunction with other root pathogens to kill subalpine fir.
<b>Black stain root disease</b> <i>Ophiostoma wagneri</i> (= <i>Ceratocystis wagneri</i> )	Pinyon pine	Idaho, Nevada, Utah	This fungus caused pinyon pine mortality on the Bureau of Land Management Burley District in Idaho, on the Humboldt and Toiyabe National Forests in Nevada, and on the Manti-LaSal National Forest in Utah.
<b>Schweinitzii butt rot</b> <i>Phaeolus schweinitzii</i>	Douglas-fir, Ponderosa pine	Idaho	Decay was common in mature and overmature forests throughout the host type, especially those having a fire or logging history. The fungus was often associated with other root diseases and bark beetle activity.
<b>Tomentosus root disease</b> <i>Inonotus tomentosus</i>	Douglas-fir, Spruce, Subalpine fir	Idaho, Utah	This fungus was found alone or associated with <i>P. schweinitzii</i> causing root and butt rot of pole-size and larger trees in southern Idaho. In southern Utah, it killed pole-size and larger spruce in progressively enlarging disease centers.



Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming--Continued

Disease	Host	Location	Remarks
<b>Foliage Diseases</b>			
<b>Ash yellows</b>	Velvet ash	Nevada, Utah	No significant activity was reported in 1990.
<b>Conifer - Aspen rust</b> <b>Conifer - Cottonwood rust</b> <i>Melampsora medusae</i> <i>Melampsora occidentalis</i>	Aspen, Conifers, Cottonwood	Idaho	Infection of cottonwood and aspen was commonly observed in southern Idaho. Some aspen clones were severely defoliated by these fungi. Limited infection of conifers was observed.
<b>Douglas-fir needle cast</b> <i>Rhabdocline</i> spp.	Douglas-fir	Idaho	Incidence decreased with light to moderate infection noted throughout the range of Douglas-fir in southern and eastern Idaho.
<b>Elytroderma disease</b> <i>Elytroderma deformans</i>	Ponderosa pine	Idaho	Systemic infections occurred throughout the host type. Infection was especially evident in stands on Little Donner Summit, Cascade, Idaho, and around Idaho City, Idaho. Except in the systemic "brooms," new foliage discoloration caused by this fungus decreased in 1990.
<b>Fir broom rust</b> <i>Melampsorella caryophyllacearum</i>	Subalpine fir	Idaho, Nevada, Utah, Wyoming	Infection occurred throughout the host type. High infection levels existed in forested areas south of Twin Falls and Burley, Idaho.
<b>Fir needle cast</b> <i>Lirula</i> spp.	Subalpine fir, Grand fir	Idaho	Infection occurred at endemic levels throughout the host type.
<b>Fir needle rust</b> <i>Pucciniastrum</i> sp.	Subalpine fir	Idaho	Seedling or sapling size trees throughout the host type were variably infected. At higher elevations around McCall, Idaho, hosts were heavily infected.
<b>Larch needle cast</b> <i>Meria laricis</i>	Western larch	Idaho	Incidence and severity of infection in west central Idaho were increasing but still remained at relatively low levels.
<b>Limber pine needle cast</b> <i>Lophodermella arcuata</i>	Limber pine	Wyoming	This disease, previously observed on the Bridger-Teton National Forest, was not observed in 1990.
<b>Lodgepole pine needle cast</b> <i>Lophodermella concolor</i>	Lodgepole pine	Idaho	Scattered but increasing incidence of light to moderate intensity was noted across southern Idaho.

## Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming--Continued

Disease	Host	Location	Remarks
<b>Marssonina blight</b> <i>Marssonina populi</i>	Aspen	Idaho, Utah, Wyoming	Scattered incidence of moderate to heavy intensity was noted throughout most of the host range in southern Idaho, northern Utah, and western Wyoming.
<b>Shepherd's crook</b> <i>Venturia macularis</i>	Aspen	Idaho	Scattered but increasing incidence of light to moderate intensity was noted in southern Idaho.
<b>Spruce broom rust</b> <i>Chrysomyxa</i> <i>arctostaphyli</i>	Engelmann spruce	Idaho, Utah, Wyoming	Scattered infections occurred throughout the host type, especially in eastern Idaho.

### Nursery Diseases

<b>Fusarium root disease</b> <i>Fusarium oxysporum</i>	<i>Abies</i> spp., Douglas-fir, Ponderosa pine	Idaho	This fungus caused mortality primarily of 1-0 conifer seedlings at the Lucky Peak Nursery, Boise National Forest, Idaho.
<b>Fusarium cortical stem rot</b> <i>Fusarium avenaceum</i>	<i>Abies</i> spp., Douglas-fir, Ponderosa pine	Idaho	This fungus caused mortality primarily of 1-0 conifer seedlings at the Lucky Peak Nursery, Boise National Forest, Idaho.
<b>Phytophthora/ Pythium root rot</b> <i>Phytophthora</i> spp. <i>Pythium</i> spp.	Douglas-fir, Spruce	Idaho	These fungi occurred on seedlings and in soil at the Lucky Peak Nursery, Boise National Forest, Idaho. In some beds, infection resulted in above-normal mortality and culling of 2-0 seedlings.

### Abiotic

<b>Drought effects</b>	All vegetation	Regionwide	Premature needle drop, leaf scorch, and seedling mortality were observed due to 5 consecutive years of below normal precipitation.
<b>Frost</b>	Gambel oak	Utah	A severe spring frost caused twig and branch dieback on Gambel oak along the Wasatch front on the Wasatch-Cache National Forest in Utah.

**TABLE 1. Number of trees and acres killed by bark beetles in Region 4 during 1990 as determined by aerial detection surveys.**

Forest* & Adjacent Land	Mountain Pine Beetle		Douglas-fir Beetle		Ips/Western Pine Beetle		Spruce Beetle		Fir Engraver/Western Balsam Bark Beetle		Jeffrey Pine Beetle		TOTALS	
	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres
Ashley	150	100	530	300	--	--	--	--	110	60	--	--	790	460
Boise	445	400	62,415	59,400	18,150	25,460	--	--	30,690	73,450	--	--	111,700	158,710
Bridger-Teton	495	280	9,250	12,140	--	--	145	120	21,525	11,830	--	--	31,415	24,370
Caribou <sup>1</sup>	--	--	41,960	31,020	--	--	--	--	35,850	22,970	--	--	77,810	53,990
Challis	2,320	3,660	6,615	6,350	--	--	--	--	--	--	--	--	8,935	10,010
Dixie	1,305	910	--	--	--	--	--	--	--	--	--	--	1,305	910
Fishlake	--	--	--	--	--	--	850	675	--	--	--	--	850	675
Manti-LaSal	675	1,075	1,715	1,320	--	--	7,865	4,460	--	--	--	--	10,255	6,855
Payette	--	--	18,535	27,115	5,680	14,720	185,460	152,810	--	--	--	--	209,675	194,645
Salmon	1,420	1,360	11,095	9,060	--	--	--	--	--	--	--	--	12,515	10,420
Sawtooth	5,070	2,730	12,505	9,630	--	--	--	--	830	1,120	--	--	18,405	13,480
Targhee	--	--	11,590	7,240	--	--	--	--	24,085	13,110	--	--	35,675	20,350
Tolyabe	--	--	--	--	--	--	--	--	85,500	70,900	85,500	70,900	171,000	141,800
Uinta	--	--	--	--	--	--	50	20	--	--	--	--	50	20
Wasatch-Cache <sup>2</sup>	--	--	2,170	2,010	--	--	--	--	15,490	14,970	--	--	17,660	16,980
<b>TOTAL</b>	<b>11,880</b>	<b>10,515</b>	<b>178,380</b>	<b>165,585</b>	<b>23,830</b>	<b>40,180</b>	<b>194,370</b>	<b>158,085</b>	<b>214,080</b>	<b>208,410</b>	<b>85,500</b>	<b>70,900</b>	<b>708,040</b>	<b>653,675</b>

\*Only portions of Forests flown; actual mortality figures are probably considerably higher.

<sup>1</sup> Includes nearby Bureau of Land Management and State lands.

<sup>2</sup> Includes portions of Forest administered by the Caribou National Forest.



**TABLE 2. Status of *mountain pine beetle* infestations by state during 1990.**

**IDAHO**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	6.9	8.0
Other Federal	0.3	0.3
State and Private	1.0	1.0
TOTAL	8.2	9.3

**UTAH**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	1.8	1.9
Other Federal	0.1	0.1
State and Private	0.1	0.1
TOTAL	2.0	2.1

**WYOMING**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	0.3	0.5
Other Federal	0.0	0.0
State and Private	0.0	0.0
TOTAL	0.3	0.5

**TABLE 3. Status of *spruce beetle* infestations by state during 1990.**

**IDAHO**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	143.7	174.5
Other Federal	1.5	1.8
State and Private	7.6	9.2
<b>TOTAL</b>	<b>152.8</b>	<b>185.5</b>

**UTAH**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	5.2	5.2
Other Federal	0.0	0.0
State and Private	0.0	0.0
<b>TOTAL</b>	<b>5.2</b>	<b>5.2</b>

**WYOMING**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	0.1	0.1
Other Federal	0.0	0.0
State and Private	0.0	0.0
<b>TOTAL</b>	<b>0.1</b>	<b>0.1</b>

**TABLE 4. Status of *Douglas-fir* beetle infestations by state during 1990.****IDAHO**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	128.1	141.6
Other Federal	3.7	6.6
State and Private	18.0	16.5
<b>TOTAL</b>	<b>149.8</b>	<b>164.7</b>

**UTAH**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	3.6	4.4
Other Federal	0.0	0.0
State and Private	0.0	0.0
<b>TOTAL</b>	<b>3.6</b>	<b>4.4</b>

**WYOMING**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	10.6	8.3
Other Federal	0.5	0.5
State and Private	1.0	0.5
<b>TOTAL</b>	<b>12.1</b>	<b>9.3</b>



**TABLE 5. Status of *western pine beetle* infestations by state during 1990.**

**IDAHO**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	33.4	19.7
Other Federal	0.8	0.5
State and Private	6.0	3.6
<b>TOTAL</b>	<b>40.2</b>	<b>23.8</b>

**TABLE 6. Status of *Jeffrey pine beetle* infestations by state during 1990.**

**NEVADA**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	56.9	68.4
Other Federal	--	--
State and Private	14.0	17.1
<b>TOTAL</b>	<b>70.9</b>	<b>85.5</b>

**TABLE 7. Status of *fir engraver beetle* and *western balsam bark beetle* infestations by state during 1990.**

**IDAHO**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	103.3	74.5
Other Federal	0.0	0.0
State and Private	7.4	17.0
<b>TOTAL</b>	<b>110.7</b>	<b>91.5</b>

**NEVADA**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	63.9	76.9
Other Federal	0.0	0.0
State and Private	7.0	8.5
<b>TOTAL</b>	<b>70.9</b>	<b>85.4</b>

**TABLE 7. Status of *fir engraver beetle* and *western balsam bark beetle* infestations by state during 1990--continued.**

**UTAH**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	15.5	15.5
Other Federal	0.0	0.0
State and Private	0.0	0.0
<b>TOTAL</b>	<b>15.5</b>	<b>15.5</b>

**WYOMING**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	11.8	21.5
Other Federal	0.0	0.0
State and Private	0.0	0.0
<b>TOTAL</b>	<b>11.8</b>	<b>21.5</b>



**TABLE 8. Acres of defoliation by *Douglas-fir tussock moth* in Region 4 during 1990 as determined by aerial detection surveys.**

	Defoliation Intensity			
Forest and Adjacent Land	Light	Moderate	Heavy	Total
Boise	10,700	8,500	17,600	36,800
Payette	11,000	0	0	11,000
Sawtooth	1,300	800	0	2,100
Owyhee Co.	800	0	0	800
Wasatch-Cache	600	600	1,700	2,900
<b>R-4 TOTALS</b>	<b>24,400</b>	<b>9,900</b>	<b>19,300</b>	<b>53,600</b>

**TABLE 9. Status of *Douglas-fir tussock moth* by state during 1990.**

**IDAHO**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>
National Forest	50.4
Other Federal	0.8
State and Private	0.0
<b>TOTAL</b>	<b>51.2</b>

**UTAH**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>
National Forest	2.9
Other Federal	0.0
State and Private	0.0
<b>TOTAL</b>	<b>2.9</b>

**TABLE 10. Acres of defoliation by *western spruce budworm* in Region 4 during 1989-1990 as determined by aerial detection surveys.**

		Defoliation Intensity				
Forest* and Adjacent Land	Year	Light	Moderate	Heavy	Total	Change
Challis	1990	314	441	0	755	+ 507
	1989	248	0	0	248	
Salmon	1990	36,149	4,384	1,384	41,837	+ 41,549
	1989	288	0	0	288	
Targhee	1990	0	0	0	0	- 10,340
	1989	10,340	0	0	10,340	
<b>R-4 TOTALS</b>	1990	36,463	4,825	1,304	42,592	+ 31,716
	1989	10,876	0	0	10,876	

\*Only portions of Forests flown; actual acreage may be greater.

**TABLE 11. Status of *western spruce budworm* by state during 1990.**

**IDAHO**

Land Ownership Class	Outbreak Area (Thousand Acres)
National Forest	42.6
Other Federal	--
State and Private	--
<b>TOTAL</b>	<b>42.6</b>



**TABLE 12. Dwarf mistletoe accomplishments - Intermountain Region, 1990.**

<b>National Forest</b>	<b>Presuppression Survey Acres</b>	<b>Suppression Project Acres</b>
Ashley	400	425
Boise	0	350
Bridger-Teton	0	260
Caribou	5,000	500
Challis	0	410
Dixie	1,295	720
Fishlake	2,000	30
Manti-LaSal	130	0
Payette	0	465
Salmon	0	220
Sawtooth	0	200
Targhee	0	1,000
Toiyabe	0	103
Uinta	0	0
Wasatch-Cache	0	550
<b>TOTAL</b>	<b>8,825</b>	<b>5,233</b>

Figure 1. Areas infested by mountain pine beetle and Jeffrey pine beetle in Region 4 during 1990 as observed during aerial detection surveys.







Figure 2. Areas infested by spruce beetle in Region 4 during 1990 as observed during aerial detection surveys.

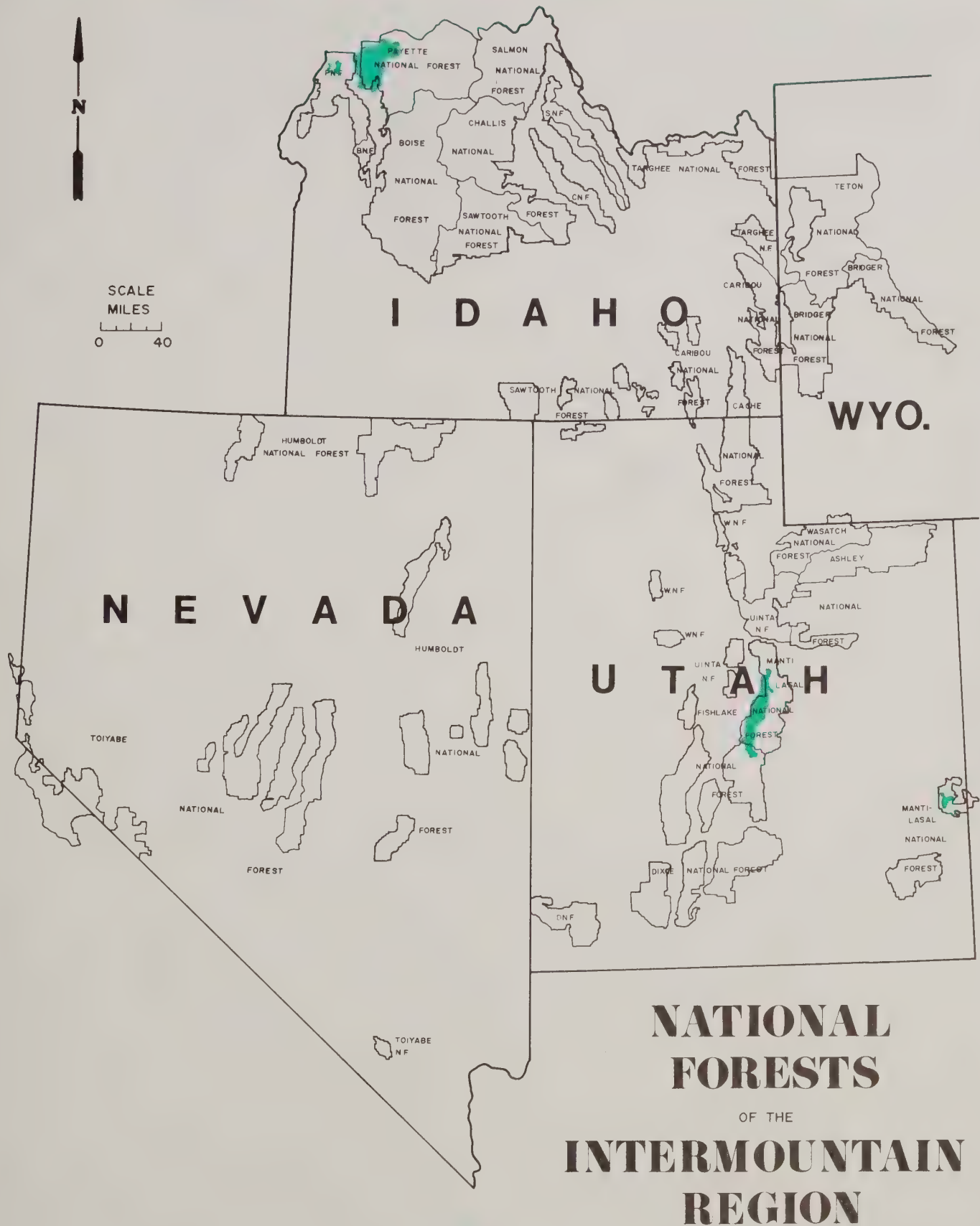




Figure 3. Areas infested by Douglas-fir beetle in Region 4 during 1990 as observed during aerial detection surveys.

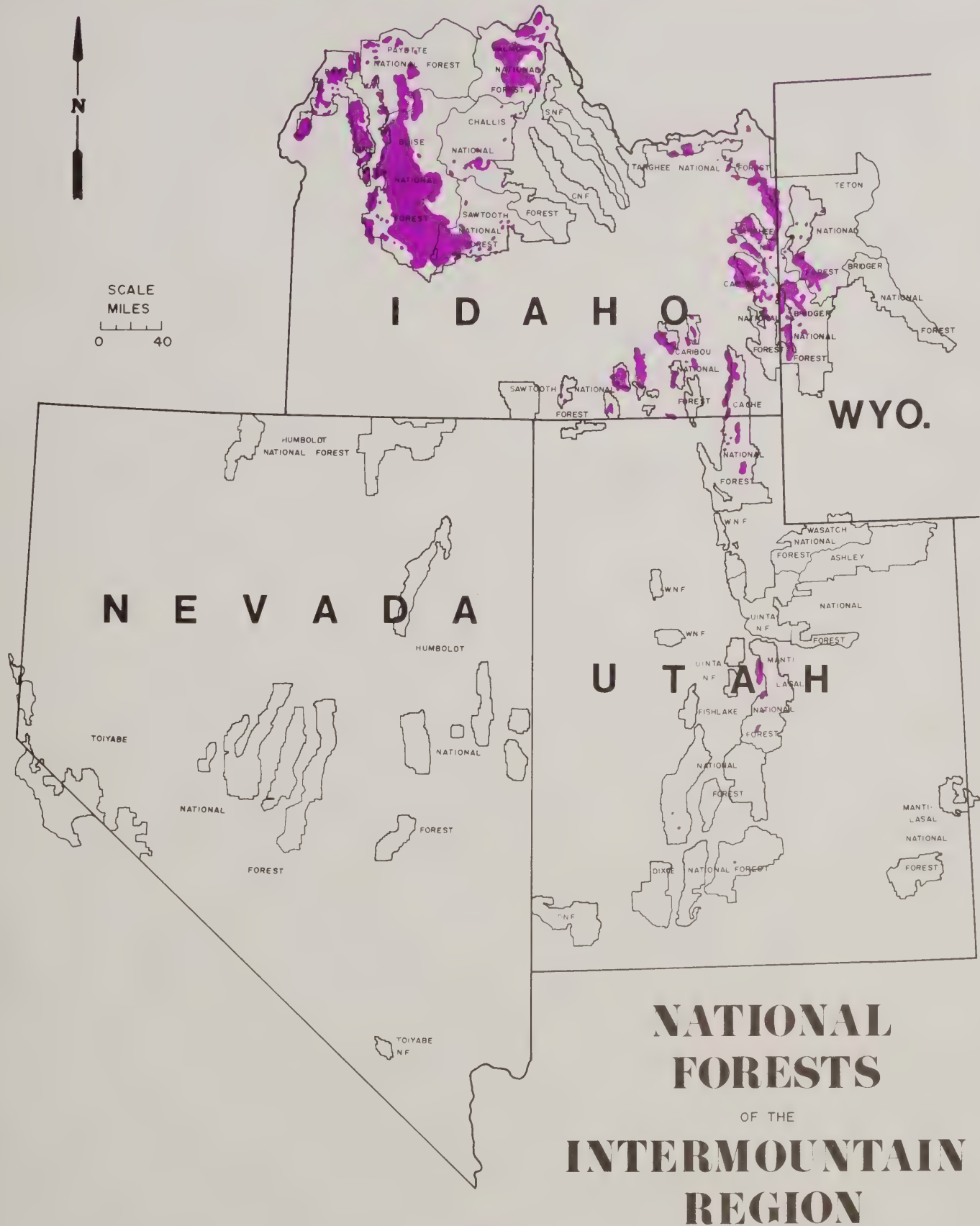






Figure 4. Areas infested by western pine beetle and pine engraver beetle in Region 4 during 1990 as observed during aerial detection surveys.







Figure 5. Areas infested by fir engraver beetle and western balsam bark beetle in Region 4 during 1990 as observed during aerial detection surveys.



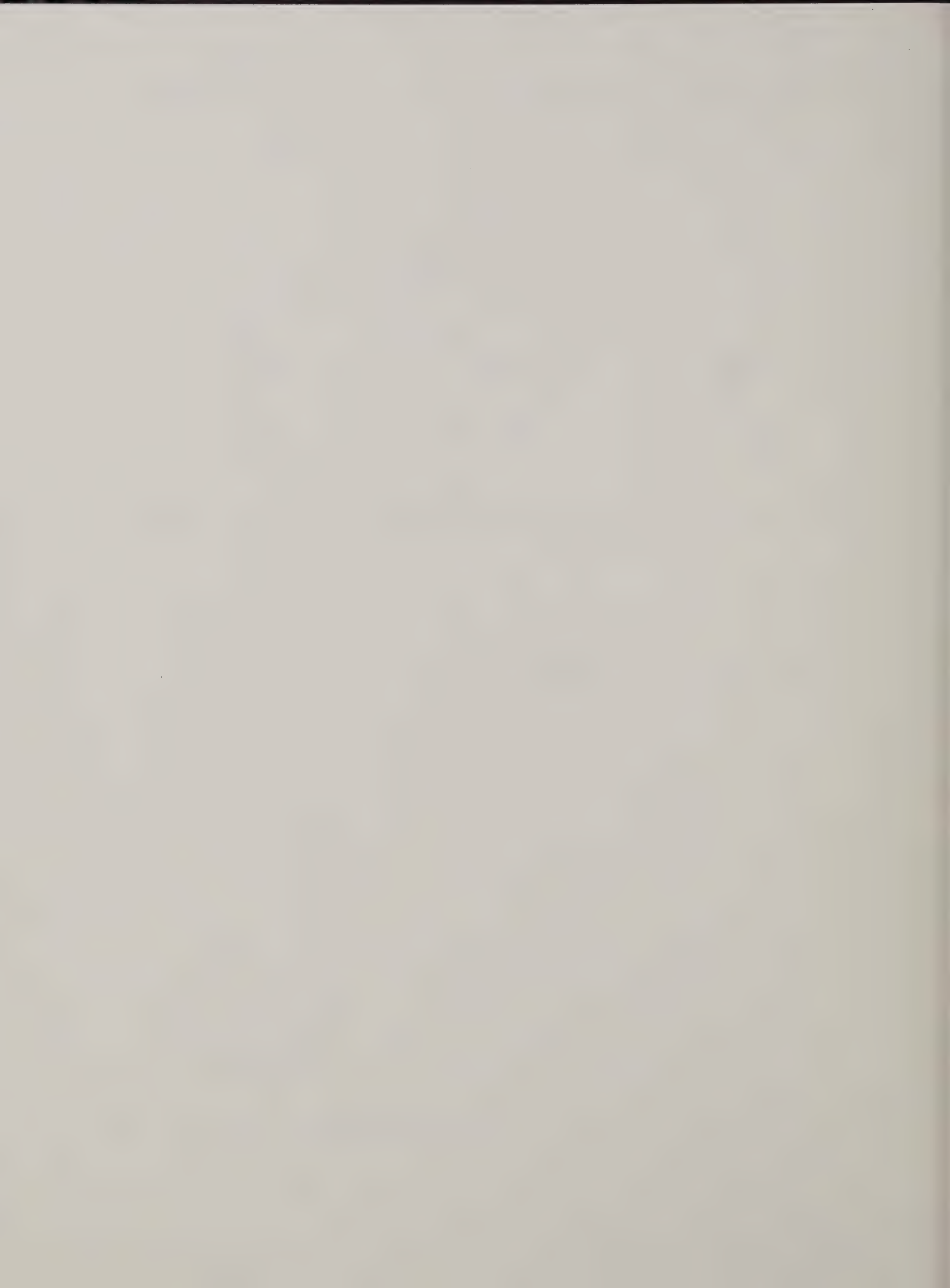


Figure 6. Areas infested by Douglas-fir tussock moth in Region 4 during 1990 as observed during aerial detection surveys.







Figure 7. Areas infested by western spruce budworm in Region 4 during 1990 as observed during aerial detection surveys.





## SPECIAL PROJECT UPDATE

**Evaluation of a combined carbaryl spray and bait strategy to reduce western pine beetle caused mortality in second-growth ponderosa pine stands in southern Idaho.** This study, now completed on the Council Ranger District, Payette National Forest, examined the effect of establishing a variable number of "spray and bait" centers over a large area. One "spray and bait" center was established for each 10 trees killed by western pine beetle in 5, 640-acre test areas. A "spray and bait" center consists of a number of uninfested ponderosa pine trees sprayed with a registered insecticide, carbaryl, and baited with a semiochemical attractant. Earlier studies have indicated that this technique is capable of manipulating beetle pressure over smaller areas, but an areawide influence has not been demonstrated. Post-treatment aerial photos are being evaluated and analysis begun. The baits strongly attracted beetles, and the insecticide prevented successful infestation of treated trees.

**Semiochemical baiting efficiency for Douglas-fir beetle.** This project was completed, and a manuscript has been submitted to the "Journal of Economic Entomology." Results showed that, on the average, 5.8 times and 6.4 times more trees were infested on plots with 2 or 5 semiochemical baits, respectively, compared to the unbaited control plots. The average number of infested trees did not differ significantly between baited plots.

**Warm Fork timber sale semiochemical trial area.** This study, located on the New Meadows Ranger District, Payette National Forest, encompasses a timber sale originally proposed for harvest from 1992 to 1997. With increased western pine beetle activity, the scope and concept of the sale was changed. The sale date was changed to 1989, the sale volume increased, and high-risk ponderosa pine units were to be harvested within 2 years. Special contract provisions were developed to accommodate semiochemical baiting of clearcut units. Aerial photography, both prior to and following harvest, will provide a means to evaluate the "bait and cut" technique and provide a record of harvest activity. Post-treatment aerial photos will be taken in 1991.

**A Field Test of the Efficacy of Verbenone in Preventing Ponderosa Pine Infestation by Western Pine Beetle.** This now complete investigation on the Council Ranger District, Payette National Forest, tested the influence of a 66%+/33%- enantiomeric blend of verbenone on tree infestation by western pine beetle. Although data have not yet been analyzed, it appears verbenone had no significant influence on the degree of infestation in treated plots.

**Western Pine Beetle Infestation Containment Using Semiochemical Baits.** Ten pairs of plots on the Emmett Ranger District, Boise National Forest, were randomly treated with western pine beetle semiochemical baits to determine whether overwintering populations of beetles could be contained on site. Although analysis was incomplete, treated plots were surrounded by more infested trees than untreated plots implying containment of the overwintered population.

**Special assessment of the susceptibility of fire-damaged trees to attack by bark beetles.** Seventy-two permanent plots were installed in moderately burned stands within the boundary of the Lowman fire on the Boise National Forest in 1989. These plots were revisited in 1990, and plans are to revisit the plots annually during the next 4 years. Many of the plots, or at least trees within the plots, were salvage logged. Preliminary data collected from the remaining plots indicated that bark beetles had not aggressively attacked live trees within the burn. It is likely that trees attacked by bark beetles after the fire and trees with the highest probability of attack were removed in the salvage logging. Wood borers were found to be active in the burn area.



**Douglas-fir Beetle Suppression Strategies.** This ambitious evaluation was conducted on the Council Ranger District, Payette National Forest. Five different treatments were replicated and data gathered relative to beetle attack and tree mortality. Data are being formatted for analysis.

**Special assessment of tree mortality and growth reduction in stands previously defoliated by western spruce budworm.** Beginning in 1978, a series of permanent plots was installed in susceptible host type scattered throughout southern Idaho. Green stand information and defoliation estimates were recorded when the plots were originally installed. Stands on the Boise, Payette, and Salmon National Forests have been remeasured. These data will be summarized in an attempt to quantify rates of tree mortality and growth reduction in stands defoliated by western spruce budworm. In addition, data will be used to validate the western spruce budworm extension of the Central Idaho Variant of Prognosis.

**Special research project to evaluate mountain pine beetle response to different verbenone dosages in lodgepole pine stands.** A cooperative field test of various rates of verbenone, a bark beetle antiaggregative semiochemical, was installed by personnel from Forest Pest Management and the Intermountain Research Station during 1990 in the Sawtooth National Recreation Area. This test was designed to determine an optimum treatment rate to prevent mountain pine beetle infestations in lodgepole pine stands. Treatment rates of 20 and 40 verbenone bubble caps per acre were deployed. Results were not encouraging. A similar project is proposed for 1991 in order to answer some of the questions arising from the 1990 test.

**Special research project to evaluate aerial application of four formulations of verbenone to reduce tree mortality by mountain pine beetle in Montana and Idaho.** A cooperative field test of four formulations of aerially applied verbenone was installed in Montana and Idaho by personnel from Forest Pest Management (Region 1 and Region 4) and Pacific Southwest Research Station. Preliminary data from the 1990 test are not encouraging. It appears that there may have been problems with the controlled release rate of verbenone from the various formulations.

**Validation project for mountain pine beetle extensions of the Prognosis Model.** The purpose of this study is to test the behavior of the current mountain pine beetle impact models as extensions to the Prognosis Model for Stand Development and to compare model predictions to actual outbreak histories in Region 4 forests. Data are being analyzed from 33 lodgepole pine stands located in northern Utah (the Ashley and Wasatch-Cache National Forests). A final report should be completed this year.

**Protection of Ponderosa Pine from Attack by Western Pine Beetle.** A pyrethroid insecticide test established in 1989 in Idaho was re-evaluated for the fourth time during October 1990. The pilot test of three rates of two pyrethroid insecticides--esfenvalerate and cyfluthrin--and two formulations of carbaryl was originally planned to terminate in late fall, 1990. However, preliminary results from the June 1990 evaluation indicated continued protection from some of the tested preventive sprays, despite four beetle attack periods (June 1989, September 1989, June 1990, and October 1990) induced by hanging western pine beetle attractant baits on all trees. We are currently evaluating our data to determine if sufficient live trees remain in some of the tested replications to warrant an additional baiting to determine longevity of pesticide effectiveness.

**Dwarf mistletoe control with ethephon.** The 2-year study, conducted on the Emmett Ranger District of the Boise National Forest, to determine the effectiveness of the growth regulator, ethephon, to cause dwarf mistletoe shoot abscission on ponderosa pine infections was completed in 1989. The results are being printed as a research station note by PNW in LaGrande, Oregon.

**Thinning demonstration of dwarf mistletoe infected lodgepole pine on the Targhee National Forest.** Sixteen, 100-tree plots were established in 1983 to demonstrate the effect of dwarf mistletoe on lodgepole pine spaced to four different thinning regimes. The plots were remeasured in 1988, and analysis of data is continuing.

**Special project to evaluate the use of portable global positioning units for gypsy moth detection surveys.** Trimble Transpack GPS units were used to place and retrieve traps using the latitude/longitude coordinates displayed at the time of trap placement. Trap coordinates used in this survey originated from the Utah Department of Agriculture's Geographic Information System (Tydec-Spans). Approximately 2,000 gypsy moth pheromone delimitation traps were placed in remote areas in Utah in 1990. An equal number of control points in similar terrain were used for comparison. All trap locations were identified on 1:24,000 USGS topographic maps and 9x9 color aerial photos. Preliminary results indicate trap retrieval success when 4 satellites are available for position fixes and the satellite signals are not disrupted by the military.

**Special research project to evaluate mountain pine beetle response to verbenone in ponderosa pine stands.** A cooperative field test of verbenone, bark beetle antiaggregative semiochemical, was installed by personnel from Forest Pest Management and the Intermountain Research Station during 1990 in the Monticello Ranger District of the Manti-LaSal National Forest. The test was designed to determine if mountain pine beetle attacks can be prevented in ponderosa pine stands. There were 10 replicates--a replicate being a control (no bubble caps) paired with a test block having a variable number of bubble caps. The number of bubble caps placed varied from 53 to 200 depending on the number of green trees 8 inches and larger. No significant differences existed between treated and control blocks. Due to the plastic membrane of the bubble caps, only 9 percent of the material was released during the test period. A bubble cap with a thinner membrane is required to adequately test verbenone effectiveness in higher elevation ponderosa pine stands.



## RECENT PUBLICATIONS

---

- Gardner, B.R.; and Weatherby, J.C. 1990. Douglas-fir tussock moth monitoring in southern Idaho, 1989. 7 p.
- Knapp, A.; Weatherby, J.; Hoffman, J.; Kalve, V.; and LaMadeleine, L. 1990. Forest Insect and Disease Conditions, Intermountain Region 1989. FPM Report. Ogden, UT: USDA Forest Service, Intermountain Region. 31 p.
- Thier, R.W.; and Marsden, M.A. 1990. Vertical growth response of ponderosa pine infested by western pine shoot borer, *Eucosma sonomana* Kearfott (Lepidoptera: Olethreutidae). Can. Ent. 122:343-347.





## ERRATA

### FOREST INSECT AND DISEASE CONDITIONS IN THE INTERMOUNTAIN REGION, 1990

Compiled by A. Knapp, J. Weatherby, J. Hoffman, D. Hansen,  
L. LaMadeleine, and R. Williams

Pages 12 and 17, Tables 1 and 7: Trees and acres of fir engraver/western balsam bark beetle infestation were omitted. Corrected tables are attached.



**TABLE 1. Number of trees and acres killed by bark beetles in Region 4 during 1990 as determined by aerial detection surveys.**

Forest* & Adjacent Land	Mountain Pine Beetle		Douglas-fir Beetle		Ips/Western Pine Beetle		Spruce Beetle		Fir Engraver/Western Balsam Bark Beetle		Jeffrey Pine Beetle		TOTALS	
	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres
Ashley	150	100	530	300	-	-	-	-	110	60	-	-	790	460
Boise	445	400	62,415	59,400	18,150	25,460	-	-	30,690	73,450	-	-	111,700	158,710
Bridger-Teton	495	280	9,250	12,140	-	-	145	120	21,525	11,830	-	-	31,415	24,370
Caribou <sup>1</sup>	-	-	41,960	31,020	-	-	-	-	35,850	22,970	-	-	77,810	53,990
Challis	2,320	3,660	6,615	6,350	-	-	-	-	-	-	-	-	8,935	10,010
Dixie	1,305	910	-	-	-	-	-	-	-	-	-	-	1,305	910
Fishlake	-	-	-	-	-	-	850	675	-	-	-	-	850	675
Manti-LaSal	675	1,075	1,715	1,320	-	-	7,865	4,460	-	-	-	-	10,255	6,855
Payette	-	-	19,535	27,115	5,680	14,720	185,460	152,810	16,800	21,000	-	-	226,475	215,645
Salmon	1,420	1,360	11,095	9,060	-	-	-	-	-	-	-	-	12,515	10,420
Sawtooth	5,070	2,730	12,505	9,630	-	-	-	-	830	1,120	-	-	18,405	13,480
Targhee	-	-	11,590	7,240	-	-	-	-	24,065	13,110	-	-	35,675	20,350
Toiyabe	-	-	-	-	-	-	-	-	85,500	70,900	85,500	70,900	171,000	141,800
Uimta	-	-	-	-	-	-	50	20	-	-	-	-	50	20
Wasatch-Cache <sup>2</sup>	-	-	2,170	2,010	-	-	-	-	15,490	14,970	-	-	17,660	16,960
<b>TOTAL</b>	<b>11,880</b>	<b>10,515</b>	<b>178,360</b>	<b>165,585</b>	<b>23,830</b>	<b>40,180</b>	<b>194,370</b>	<b>158,065</b>	<b>230,890</b>	<b>229,410</b>	<b>85,500</b>	<b>70,900</b>	<b>724,840</b>	<b>674,675</b>

\*Only portions of Forests shown; actual mortality figures are probably considerably higher.

<sup>1</sup> Includes nearby Bureau of Land Management and State lands.

<sup>2</sup> Includes portions of Forest administered by the Caribou National Forest.





**TABLE 7. Status of *fir engraver beetle* and *western balsam bark beetle* infestations by state during 1990.**

**IDAHO**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	122.2	89.6
Other Federal	0.0	0.0
State and Private	9.5	18.7
<b>TOTAL</b>	<b>131.7</b>	<b>108.3</b>

**NEVADA**

<b>Land Ownership Class</b>	<b>Outbreak Area (Thousand Acres)</b>	<b>Number of Trees (Thousands)</b>
National Forest	63.9	76.9
Other Federal	0.0	0.0
State and Private	7.0	8.5
<b>TOTAL</b>	<b>70.9</b>	<b>85.4</b>







